

# Six-month index to Laser Focus

Vol 12 No 7 (Jul) through No 12 (Dec)

Major articles are arranged by subject. Cumulative indexes appear every January and July.

## 1 Lasers

### Chemical

Liquid-fuel chemical lasers exceed 8-kw output at TRW Aug p38  
Gas  
New excimer laser demonstrated at NRL and Livermore Jul p22  
Flowing cold gas through warm cavity to attain 1600 j from CO Jul p26

Brighter hope for kilowatts at visible and shorter wavelengths Aug p43  
20 kw with 15% electrical efficiency envisioned with closed-cycle carbon-dioxide system Oct p16  
E-beam stabilized excimer lasers, by J. H. Jacob and J. A. Mangano Oct p52  
Megawatt output expected from nuclear-pumped electronic lasers Nov p34

Asterix 3 emits 1-Tw pulses at Max Planck Institute Dec p4  
Maturing of the excimer laser described at Snowmass meeting on electronic-transition lasers, by Craig Jensen Dec p14  
Air Force builds closed-cycle laser for flowing rare gases Dec p24

### Solidstate

Distributed-feedback lasing from alkali-halide crystals Aug p39  
Designing solidstate military lasers, excerpt from a book by Walter Koehner Nov p58

### Other

2-stage pumping in search for x-ray laser Sep p12  
16- $\mu$ m source for U enrichment also would emit at 10  $\mu$ m Nov p20  
Megawatt output predicted from nuclear-pumped electronic lasers Nov p34  
Specifications for a fusion laser, by Jack Wilson and D. O. Ham Nov p38  
NRL sets shortest-wavelength record at 38 nm Dec p4

## 2 Applications in chemistry

Now chemical research, eventually processing Aug p22  
'Cars' and a new way to analyze interactions selectively Aug p48  
Mechanisms in ir-laser chemistry, by A. M. Ronn Aug p53  
Toward better understanding of complex atoms Sep p14  
Highpressure reactions seem applicable in chemical processing Oct p18  
Laser illumination induces hydrocarbon polymerization Oct p34

## 3 Communications & information handling

'First live' fiber-optic link for tv is installed in Britain Jul p22  
Visible-light photopolymer for exposing printing plates Aug p28  
Military to evaluate laser recorders for highresolution tv Aug p28  
RCA builds laser-videodisk prototype for tv broadcasting Aug p30  
Long bar code scanned in airline baggage-handling system Aug p33  
Laser display is offered for advertising applications Aug p39  
Hi-fi color negatives produced from slides with 3 laserbeams Sep p16  
Optical computing to control quality of hypodermic needles Oct p32  
Japan picks optical fibers for field test of 'wired city' Nov p14  
European groups describe optical-communications tests Nov p28

## 4 Energy Applications

Soviet fusion laser is self q-switching Jul p4

Laser Focus January 1977

Energy applications, editorial Jul p6

Isotope-separation chronology, letter by Reed J. Jensen July p8  
Japan favors glass rods for fusion research but studies disks Aug p4

Fusion chronology, letter by G. Reinhold Aug p8  
The long and short of wavelengths for separating U isotopes Aug p12

Improved targets ease demands on lasers for fusion research Aug p18  
Inertial confinement with ion beams: new contender for fusion Aug p36

Fusion-pellet production, letter by W. Riedmueller Sep p9  
Soviet fusion pellet said to convert e-beam energy to thermal x rays Sep p12

Energy research with laser will expand 38% in fiscal 1977 Sep p16  
Robinson and Jensen to head photochemistry division at LASL Sep p64

New rival to laser as isotope sorter Oct p4  
Pressing questions on ionbeam fusion Oct p24  
Erda slows e-beam-solenoid efforts toward fusion Oct p36

Profit... from fusion research? Oct p40  
Laser studies stressed at Erda's combustion-research center Nov p12

Proposed U-enrichment source would emit at 10 and 16  $\mu$ m Nov p20  
Livermore expands scope to all inertial-confinement fusion Nov p34

Specifications for a fusion laser, by Jack Wilson and D. O. Ham Nov p38  
Perkins and McCall to head Los Alamos fusion group Nov p66

Asterix 3 reaches terawatt output Dec p4  
One ionbeam approach termed 'premature,' letter by F. Winterberg Dec p8

KMS Fusion gets \$1.3-million two-month Erda contract Dec p30  
Avco building saturable absorber for CO<sub>2</sub> fusion laser at Los Alamos Dec p34

## 5 Materials working, measurement & inspection

Heterodyne detection extended to mid-ir wavelengths Jul p20  
Distances measured to 1 part in 10<sup>7</sup> with 2 lasers Jul p25  
Motorola's passive technique for trimming diffused resistors Jul p27

Strain measured in 3 dimensions with speckle interferometry Sep p20  
Observing heat transport in turbulent flows with interferometry Sep p20

Submicrometer hole drilled with laser for IC package Sep p22  
Laser scanner with flat field to inspect sheets of material Sep p28  
Measure machinetool deformation holographically, by Nils Abramson Sep p28

Measurement emphasized at SPIE symposium in San Diego Oct p12  
CO<sub>2</sub> scribe cuts curves in ceramic substrates Oct p28

Optical computing adapted to hypodermic needle quality control Oct p32

GM to heat-treat engines with 5-kw CO<sub>2</sub> lasers Nov p18  
Coherent uses moderate CO<sub>2</sub> powers for cutting Dec p22  
Industrial-laser cost estimated at \$40 to \$500 per watt Dec p34

## 6 Military applications

Clark succeeds Gerry; Pike to head Arpa's laser section Jul p48

Military to evaluate laser recorders for high-resolution tv Aug p28  
 Army to test laserbeam-rider missile Aug p39  
 GTE yag to power Air Force's space communicator Sep p4  
 Army lidar detects objects invisible to microwave radar Sep p30  
 Resistant materials sought for ir windows in military aircraft Sep p32  
 Laserbeam-rider guidance produces direct hit Oct p39  
 Israel may receive laser-guided bombs Nov p4  
 Arpa's view of adaptive optics Nov p6  
 Phase compensation seen enhancing high-power-beam propagation Nov p26

### 7 Applications in research

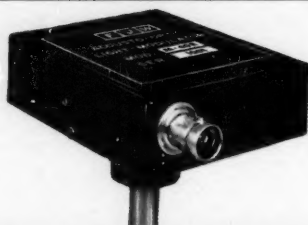
Laser-based 'virometer' speeds virus identification Jul p26  
 Biomolecules studied *in vivo* with laser-raman technique Jul p27  
 Prospects for photobiology excite spectroscopists Aug p40  
 Two-photon studies identify high-energy calcium states Sep p14  
 Heat-transport studies rely on interferometry Sep p20  
 100- $\mu$ m difference frequency obtained from single-crystal spinflip laser Sep p33  
 Laser-induced collisions demonstrated unambiguously Oct p20  
 Laser techniques highlight atomic-physics meeting Oct p28  
 MIT group studies optical analog of transistor Oct p38  
 Laser measurements aid in combustion research Nov p12  
 NRL obtains yag's 28th harmonic at 38 nm Dec p4

### 8 Biomedical applications

'Virometer' improves speed and accuracy of typing viruses Jul p26  
 Biomolecules' properties studied *in vivo* with laser raman Jul p27  
 Is photobiology the next hot field? Aug p40  
 Laser doppler measures blood flow without probes Sep p26  
 Dentists study laser sealing of tooth fissures Nov p28  
 Laser techniques applied to eye diagnosis Dec p30

### 9 Other applications

Lasers clean delicate art works, by John F. Asmus Aug p56  
 Museum of Holography opens in New York Dec p28



## FJW M-40R ACOUSTO-OPTIC LIGHT MODULATOR OFFERS THESE FEATURES:

- High percentage modulation — 100% at DC.
- High optical efficiency — 85% (typical).
- Broad wavelength from 4,000 to 12,000Å. Extended ranges also available.
- Lower power requirements than for electro-optic modulators of equivalent bandwidth.
- Can be used as a light deflector capable of over 100 spot resolution (Rayleigh criterion).
- All solid state unit — compact, inexpensive and lightweight.

Call or write today for more information



**INDUSTRIES**  
 215 East Prospect Avenue  
 Mount Prospect, Ill. 60056  
 Phone 312/259-8100

### 10 Associated equipment

Streak camera resolves fusion-target implosion Jul p4  
 Choosing a doubling crystal for yag, by C. Breck Hitz Jul p32  
 Sensors for adaptive optics, by James C. Wyant Sep p35  
 Coatings for the far ultraviolet, by Lawrence A. Stelmack Sep p41  
 When broadband ar coatings are best in a narrowband system, by Albert A. Kusch Jr. and Leonard M. Ball Sep p66  
 High-density capacitors that could shrink laser power supplies Oct p24  
 Windows appear weak spots in excimer lasers Oct p37  
 E-beam pumps for more efficient excimer lasers, by Jonah H. Jacob and Joseph A. Mangano Oct p52  
 Infrared detectors, a survey by Frances M. Lussier Oct p66  
 Inrad growing crystals in 1,300-liter rotators Nov p20  
 Cutting sampling-oscilloscope risetime, by Robert A. Lawton and James R. Andrews Nov p62  
 Saturable absorber for CO<sub>2</sub> fusion laser to be built at Avco Dec p34  
 Infrared radiometer monitors 'sleeping' volcano Dec p35  
 Designing with acousto-optic scanners, by Harmon J. Aronson Dec p36  
 Selecting transmissive materials for infrared optics, a survey by Frances M. Lussier Dec p47  
 Capabilities of replicated optics, an interview with Stephen W. Thompson Dec p58

### 11 Materials

Photopolymer for visible-laser exposure tested by Kodak Aug p28  
 Wind-resistant ir windows sought for highspeed aircraft Sep p32  
 Window-production limits cited by materials specialists Oct p37  
 Transmissive materials for infrared optics, a survey by Frances M. Lussier Dec p47

### 12 Principal meetings

Cleos 1 in San Diego is called a mixed success Jul p12  
 Quantum Electronics Conference shows coupling of R with D Aug p12  
 Tunable-laser meeting in Norway emphasizes photobiology Aug p40  
 SPIE symposium in San Diego emphasizes measurement Oct p12  
 OSA will focus on lasers at annual meeting in Tucson Oct p49  
 Symposium will accompany U.S. trade show in Tokyo Nov p22  
 Nordic laser conference emphasizes optical communications Nov p28  
 Electronic-transition laser meeting shows maturing of excimer-laser studies Dec p14

### 13 Techniques & design hints you can use

Selecting a doubling crystal for yag, by C. Breck Hitz Jul p32  
 Predicting effects of detector falloff on strapdown seekers, by Claude A. Klein and Robert W. Bierig Jul p50  
 Tracking a point source with image-dissector tube, by R. J. Hertel Aug p78  
 Narrowband applications for broadband antireflection coatings, by Albert A. Kusch Jr. and Leonard M. Ball Sep p66  
 Measuring machinetool deformation with sandwich holography, by Nils Abramson Sep p68  
 Calculate laser reliability to predict system's operating life, by Thomas R. Gagnier Oct p36  
 Automatic plotting circuitry simplifies diode-laser tests Oct p38  
 Designing solidstate military lasers, excerpt from a book by Walter Koechner Nov p58  
 Cutting sampling-oscilloscope risetime, by R. A. Lawton and J. R. Andrews Nov p62  
 Designing with acousto-optic scanners, by Harmon J. Aronson Dec p36  
 Evaluating capabilities of replicated optics, an interview with Stephen W. Thompson Dec p58

### 14 Legislation and safety

Bright commercial prospects clouded by government regulations Jul p12  
 Systems and the safety code, editorial Aug p6  
 Reporting-guide revisions completed 2 months before deadline Aug p34  
 Light-show hazards, letter by Leon Goldman Oct p8  
 Alignment lasers don't need ultrabright warning lights Oct p26

## 15 Business & organizations

New firm, Quanta-Ray, to offer tunable equipment *Jul p4*  
 3M and IBM vie in recording microfilm with he-ne lasers *Jul p16*  
 Commerce Dept. eases export rules for some laser systems *Jul p26*  
 Design Optics formed by Coherent Radiation alumni *Jul p48*  
 New firm, General Engineering, to build tiny streak camera *Aug p4*  
 GTE wins \$9.4-million yag contract from Air Force *Sep p4*  
 Strictures at an exhibition, editorial *Sep p6*  
 Energy research will expand to \$144.2 million in fiscal 1977 *Sep p16*  
 Robinson and Jensen to head new Los Alamos photochemistry division *Sep p64*  
 Carson Alexiou buys A. D. Little's detector group *Oct p4*  
 Fiat affiliate builds CO<sub>2</sub> scribe to cut curves in ceramic *Oct p28*  
 Slectro Scientific formed to manufacture he-ne tubes *Oct p39*  
 CGE seeks profit... from fusion research *Oct p40*  
 Buzawa succeeds Hardwick as Tropel general manager *Nov p4*  
 Spectra-Physics acquiring Laserplane, a construction-laser maker *Nov p18*  
 GTE sells four 5-kw CO<sub>2</sub> lasers to GM for heat treating *Nov p18*  
 U.S. laser trade show in Japan to be accompanied by symposium *Nov p22*  
 Nine laser-related products win IR-100 awards *Nov p24*  
 Perkins and McCall to lead Los Alamos fusion group *Nov p66*  
 Spectra-Physics earnings top \$40 million for 1976 *Dec p4*  
 Museum devoted to holography opens in New York *Dec p28*  
 KMS Fusion receives \$1.3-million two-month Erda contract *Dec p30*

## 16 Authors

ABRAMSON, Nils, Measuring machinetool deformation holographically *Sep p68*  
 ANDREWS, James R. and Lawton, Robert A., Cutting sampling-oscilloscope risetime *Nov p62*  
 ARONSON, Harmon J., Designing with acousto-optic scanners *Dec p36*  
 ASMUS, John F., Lasers clean delicate art works *Aug p56*  
 BALL, Leonard M. and Kusch, Albert A. Jr., Broadband ar coatings for narrowband applications *Sep p66*  
 BIERIG, Robert W. and Klein, Claude A., Detector-falloff effects on strapdown seekers *Jul p50*  
 BJORKLUND, Gary C. reviews 'Quantum Electronics' *Oct p72*  
 GAGNIER, Thomas R., Calculating laser reliability to predict a system's operating life *Oct p66*  
 HAM, David O. and Wilson, Jack, Specifications for a fusion laser *Nov p38*  
 HERTEL, Richard J., Tracking a point source with an image-dissector tube *Aug p78*  
 HITZ, C. Breck, Choosing a doubling crystal for yag *Jul p32*  
 HITZ, C. Breck, Laser studies stressed in combustion research *Nov p12*  
 JACOB, Jonah H. and Mangano, Joseph A., E-beam pumped excimer lasers *Oct p52*  
 JENSEN, Craig, Maturing of the excimer laser at Snowmass electronic-transition-laser meeting *Dec p14*  
 KLEIN, Claude A. and Bierig, Robert W., Detector-falloff effects on strapdown seekers *Jul p50*  
 KUSCH, Albert A. Jr. and Ball, Leonard M., Broadband ar coatings for narrowband applications *Sep p66*  
 LAWTON, Robert A. and Andrews, James R., Cutting sampling-oscilloscope risetime *Nov p62*  
 LUSSIER, Frances M., Choosing an infrared detector *Oct p52*  
 LUSSIER, Frances M., Materials for transmissive infrared optics *Dec p47*  
 MANGANO, Joseph A. and Jacob, Jonah H., E-beam pumped excimer lasers *Oct p52*  
 RONN, A. M., Mechanisms of ir-laser chemistry *Aug p53*  
 SCHEARER, Laird D. and Willett, Colin S. review 'Advances in Quantum Electronics' *Aug p66*  
 STELMACK, Lawrence A., Coatings for the far ultraviolet *Sep p41*  
 WILLETT, Colin S. and Schearer, Laird D. review 'Advances in Quantum Electronics' *Oct p66*  
 WILSON, Jack and Ham, David O., Specifications for a fusion laser *Nov p38*  
 WYANT, James C., Sensors for adaptive optics *Sep p35*

## ENLARGE YOUR SKILLS TO MEET TODAY'S TECHNICAL CHALLENGES

### LASER INSTITUTE OF AMERICA 5-DAY SHORT COURSES

#### INFRARED: SOURCES, COMPONENTS AND SYSTEMS

MARCH 14 - 18 New Orleans

- Sources
- Detectors
- Systems
- Optics/Components
- Applications

#### LASER RADIOMETRY AND BEAM DIAGNOSTICS

APRIL 4 - 8 Denver

- Laser Properties
- Coherence-Directionality
- Polarization-Propagation
- Radiometry-Photometry
- Scientific Photography
- Power/Energy Measurements
- Methods-Instruments
- Divergence/Focused Spot
- Measurements-Profiles

#### FUNDAMENTALS AND APPLICATIONS OF LASERS

MAY 2 - 6 Dallas

- Elements of a Laser
- Lasing Action
- 3 & 4 Level Lasers
- Amplifiers/Gain
- Resonators/Modes
- Mirror Alignment
- Output Characteristics
- Selected Applications

#### LASER OPTICS

MAY 9 - 13 Dallas

- Geometrical Methods
- Analytical-Graphical-Matrix
- Wave Phenomena
- Refraction, Diffraction
- Polarization, Scattering, Propagation
- Coherent Light
- Temporal-Spatial Characteristics
- Laser, Optical Systems
- Design Requirements
- Components

#### LASER SAFETY

MAY 23 - 27 Washington, D. C.

- Laser Fundamentals
- Types-Measurements
- Laser Effects on Eyes-Skin
- Exposure Criteria
- Safety Standards
- Program Management
- Hazards Evaluation
- Control Measures

#### APPLICATIONS OF HIGH POWER LASERS

JUNE 20 - 24 Boston

- Laser Operation, CW & Pulsed
- Specifications-Safety
- Laser Absorption & Materials Interaction
- Alloying-Cladding-Surface Treatment
- Welding-Cutting-Drilling
- Scribing-Photodicing

### LASER INSTITUTE OF AMERICA OFFICIAL PUBLICATIONS

	Cost
• GUIDE TO MATERIAL PROCESSING BY LASERS	\$ 25.00
• LASER OUTPUT CHARACTERISTICS	30.00
• LASER RADIOMETRY AND BEAM DIAGNOSTICS (Two Volume Set)	60.00
• LASER SAFETY REFERENCE BOOK	25.00
• LIA LASER SAFETY GUIDE	12.50
• LASER SAFETY SLIDE SET (80 Color Slides and Taped Narrative on Laser Safety Practices)	250.00

LIA MEMBERSHIP/ANNUAL DUES - \$15.00

5-DAY SHORT COURSE - \$400.00

Discounts to members for courses and publications

For Course Info. & Registration, Write

Laser Institute of America  
 P. O. Box 1744  
 Waco, TX 76703  
 or Call  
 (817) 772-9782

For Publications & Membership Applications

Laser Institute of America  
 4100 Executive Park Dr.  
 Cincinnati, OH 45241  
 or Call  
 (513) 271-2727

